Water Treatment and Distribution Services Division
Public Works Department
City of Minneapolis

GROUND WATER SUPPLY

Preliminary Findings
For
Transportation & Public Works Committee

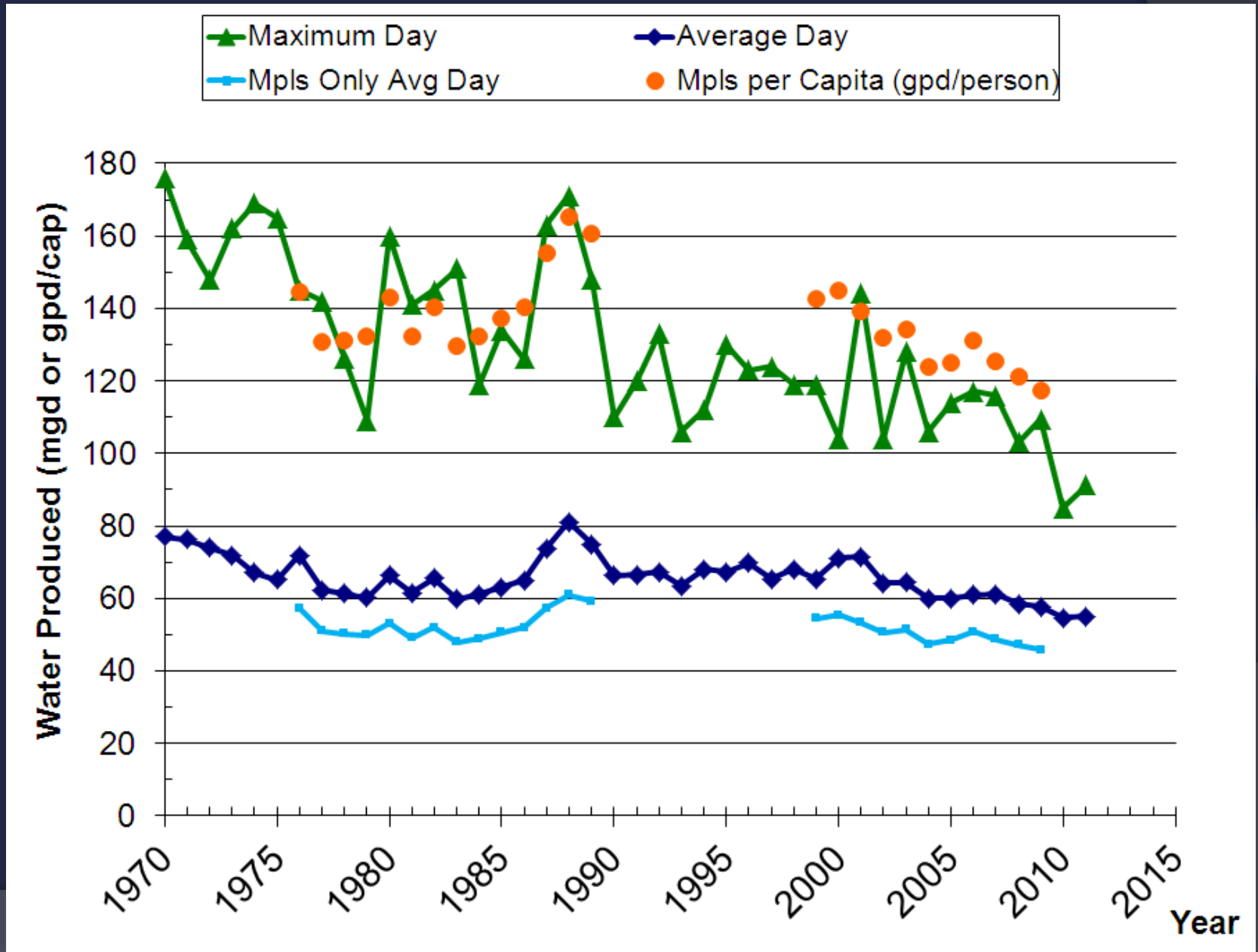
Presentation Overview:

- Why plan a ground water supply?
- Minneapolis water system goals
- Water Resources in our region
- Findings & Path forward

Why plan a ground water supply?

- System resiliency - continuous improvement
- Treatment Process benefits
- Regulatory Agencies think it is a good idea

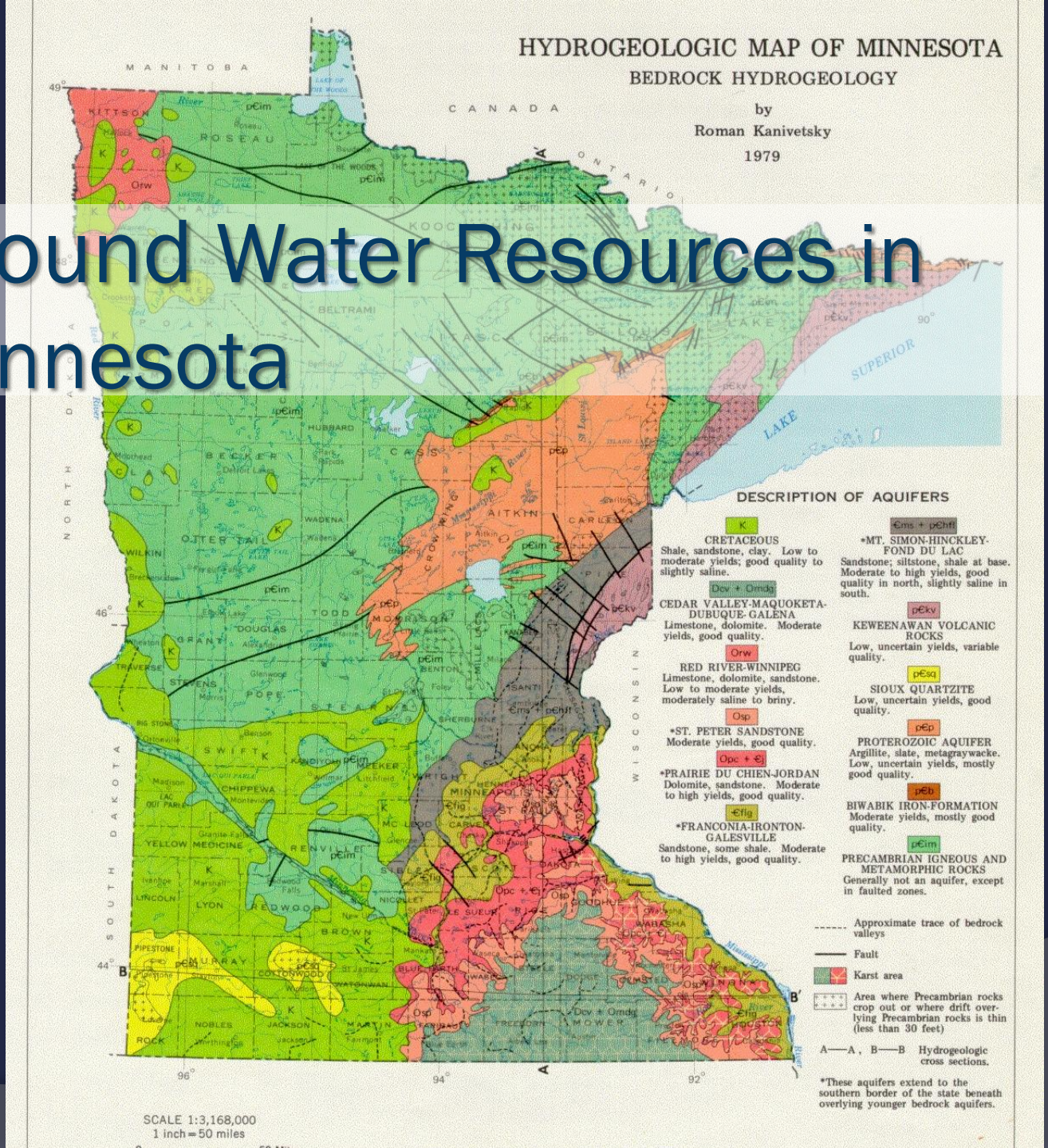
Historic Water Production



Project Goals

- Ground Water supply - 50 to 60 mgd
- Risk Reduction, multiple levels
- Consider regular use for process benefits
  - small volume
  - non-emergency
- Plan path forward for best alternative(s)

Ground Water Resources in Minnesota

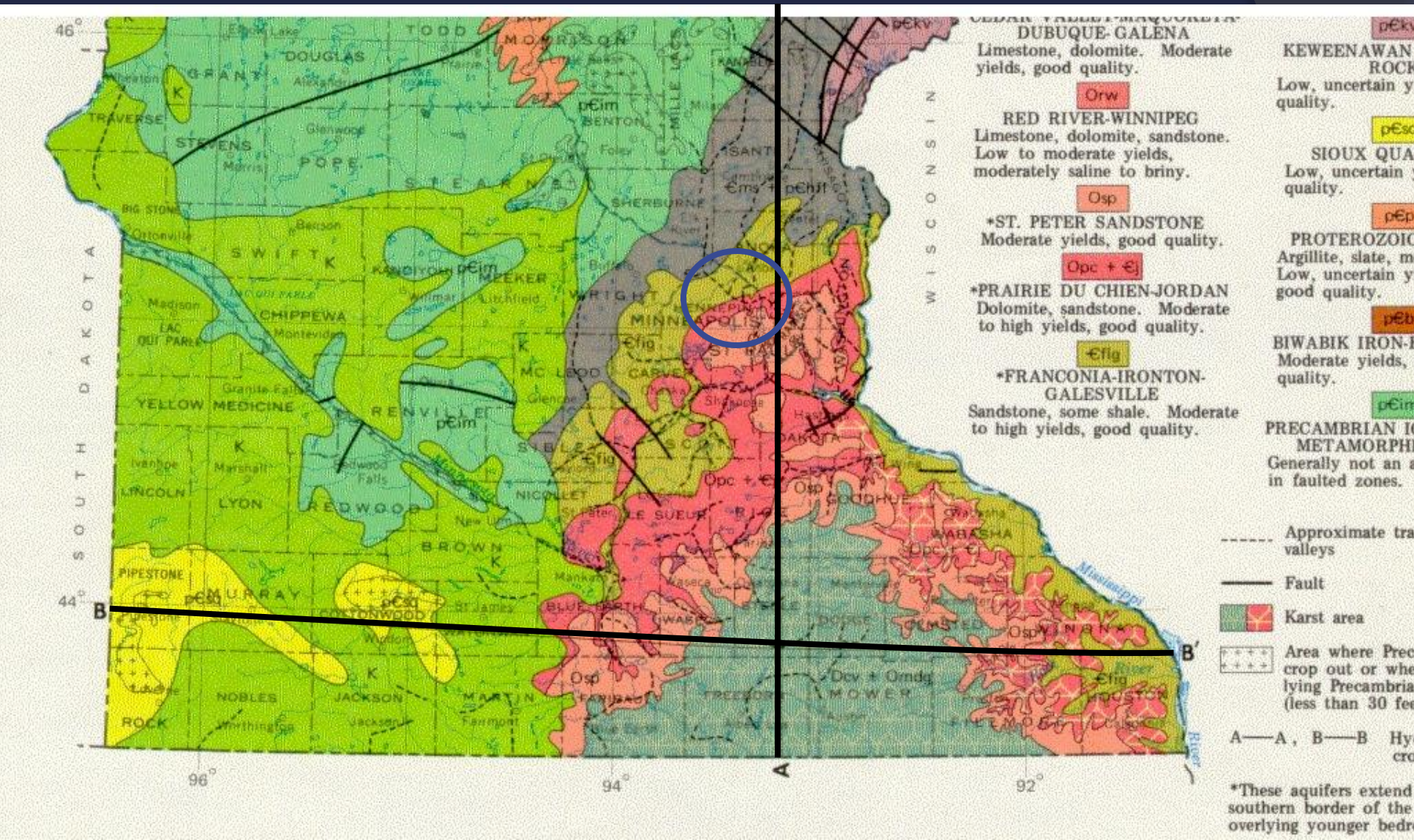


Colors represent Bedrock formation that is nearest to the ground surface.

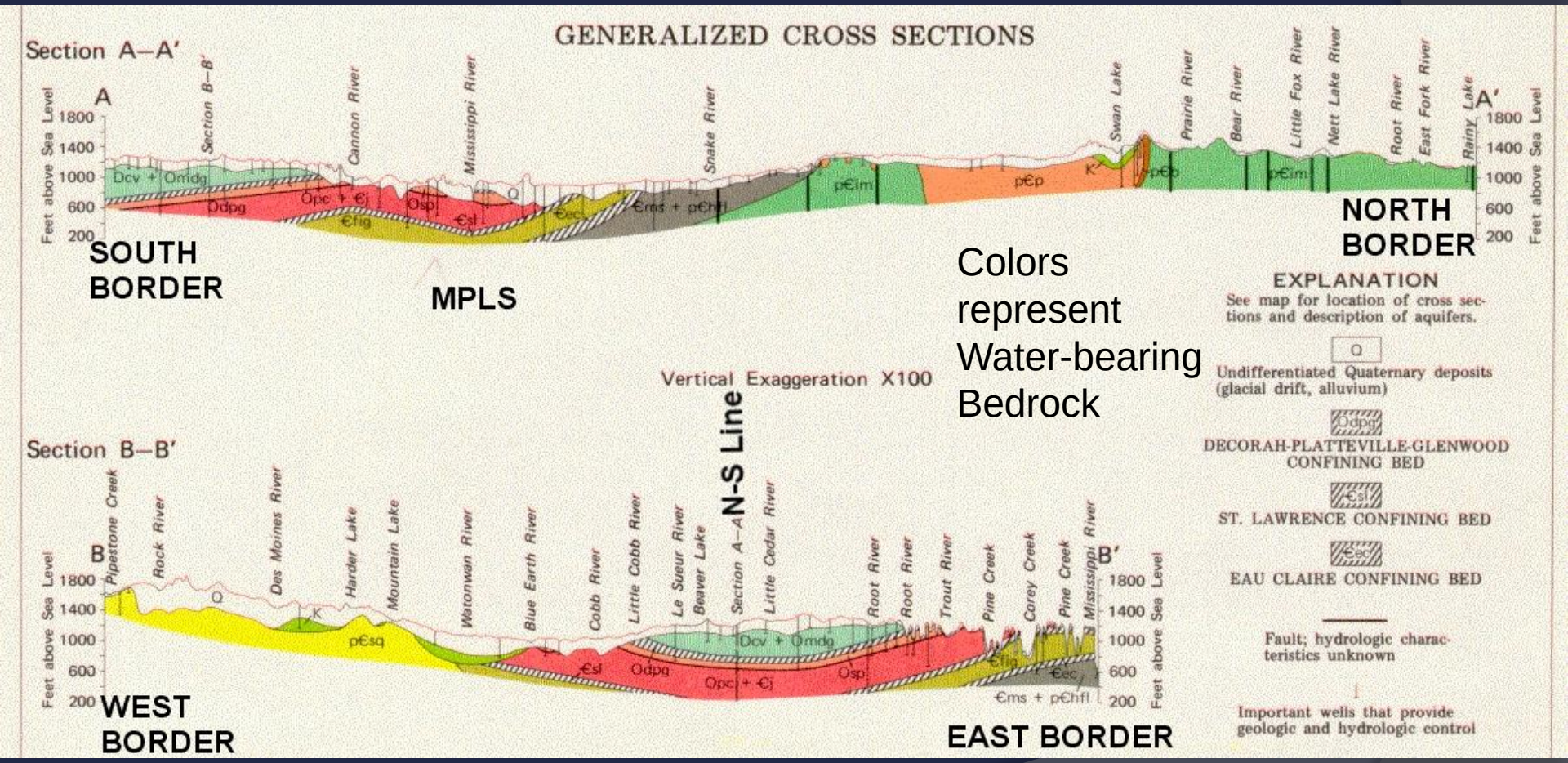
Credits: Minnesota Geological Survey

Univ. MN

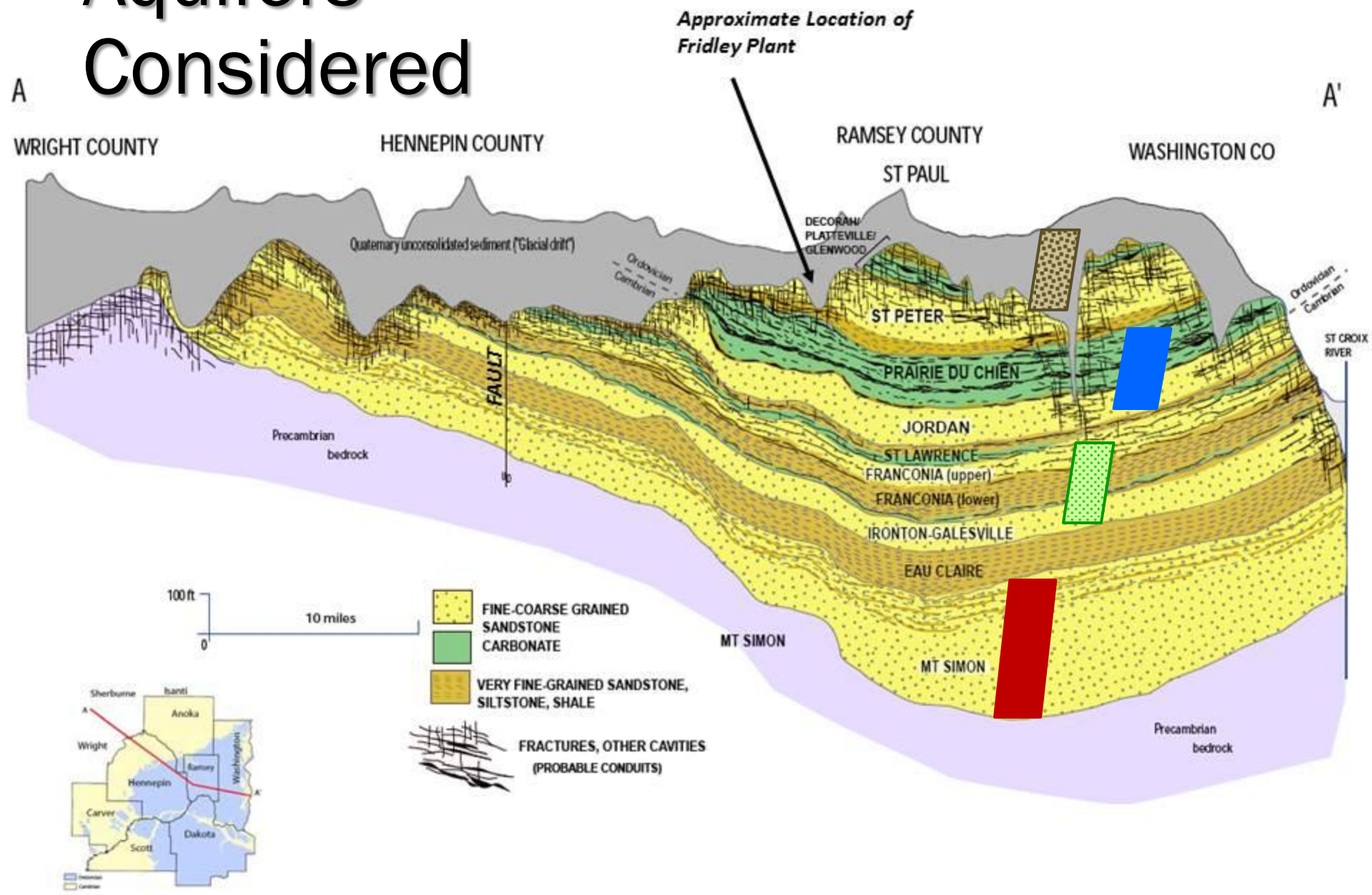
Ground Water Resources in Southern Minnesota



Geology – Cross Section



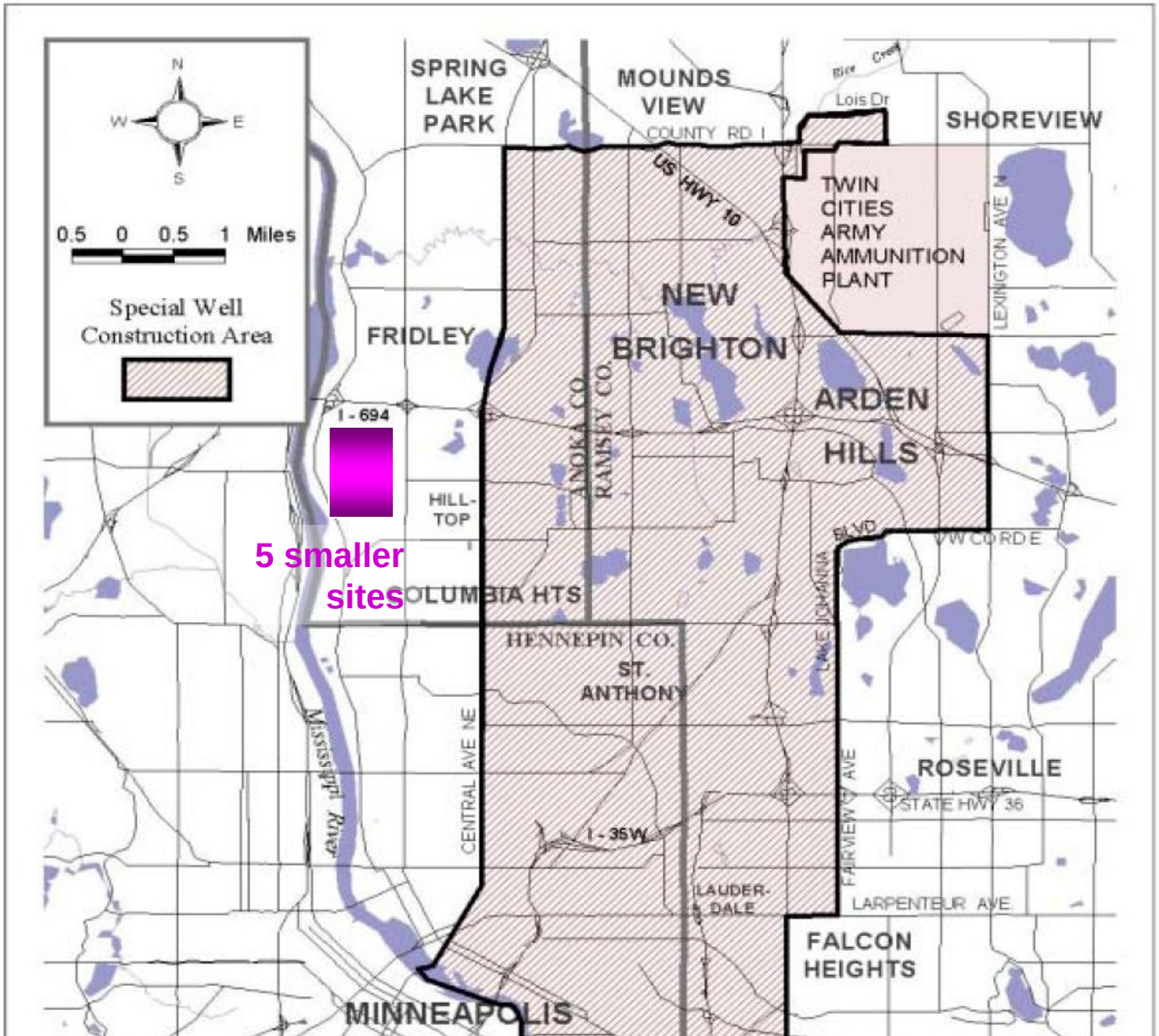
Aquifers Considered



Resource Limitations

- Aquifer Capacity
- Well Interference
- Contamination Potential
  - Increases Treatment Costs
  - Influenced by Surface Water
  - EPA "Superfund" contamination sites (historical industrial activities)

Special Well Constructon Area
Twin Cities Army Ammunition Plant



Sites Considered for Wells

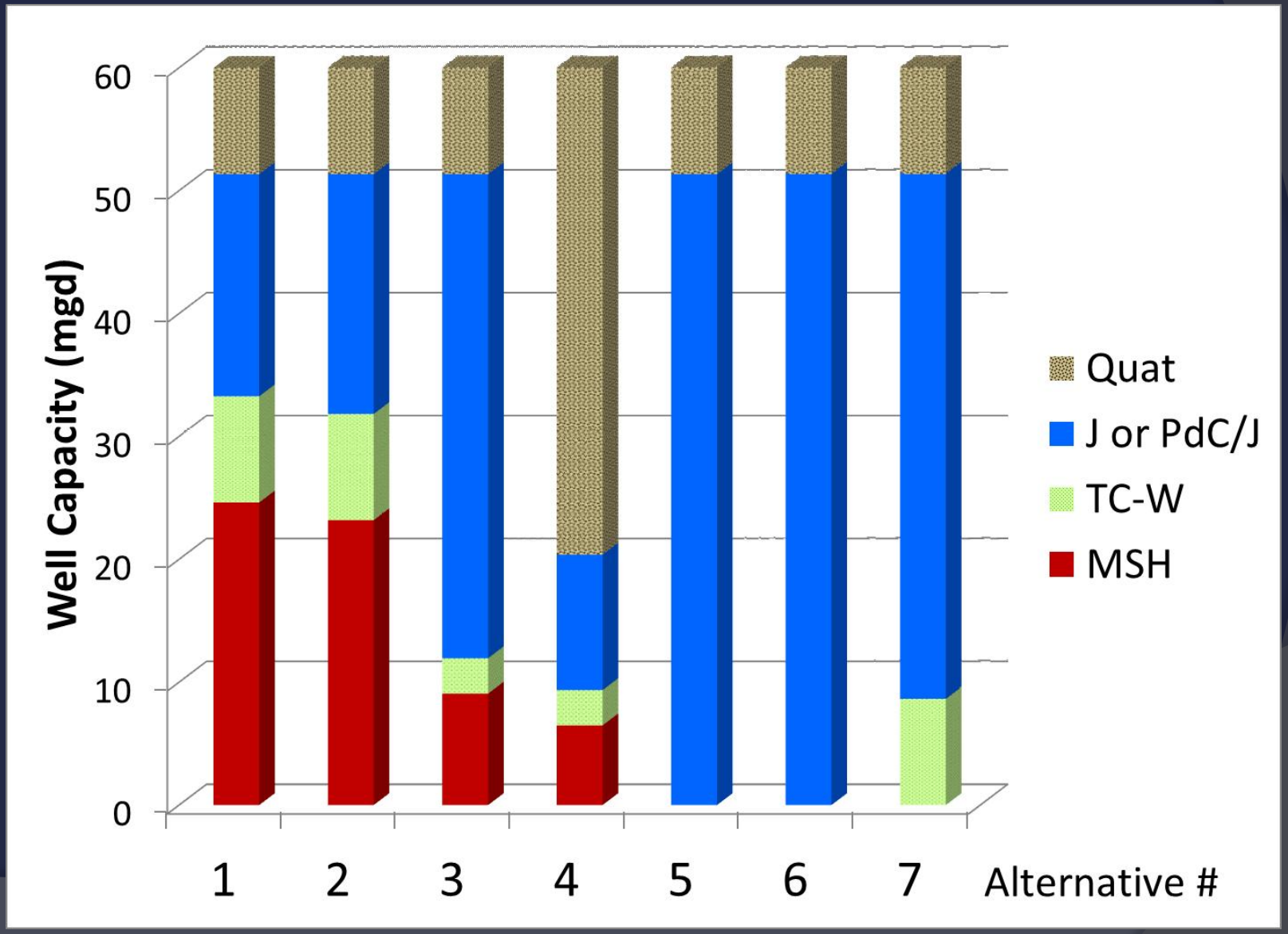
- Fridley campus
- Public areas near Columbia Heights campus
- North Minneapolis open spaces
- Southwest Pump Station

Contamination Considerations (All are treatable for a cost)

Green Boxes = Simpler Treatment

Site	Quaternary	Prairie Du Chien-Jordan	Tunnel City-Wonewoc (Franconia-Ironton-Galesville (FIG))	Mt. Simon-Hinckley
Fridley	VOCs, from NIROP & FMC	VOCs, from NIROP & FMC	None known	Natural Radionuclides
Columbia Heights	VOCs from TCAAP	VOCs from TCAAP	None known	Natural Radionuclides
SW Pump Station	Unknown	None known	None known	Natural Radionuclides
North Minneapolis	Unknown	None known	None known	Natural Radionuclides

Alternative Summary



Results favor Alts 5, 6 & 7

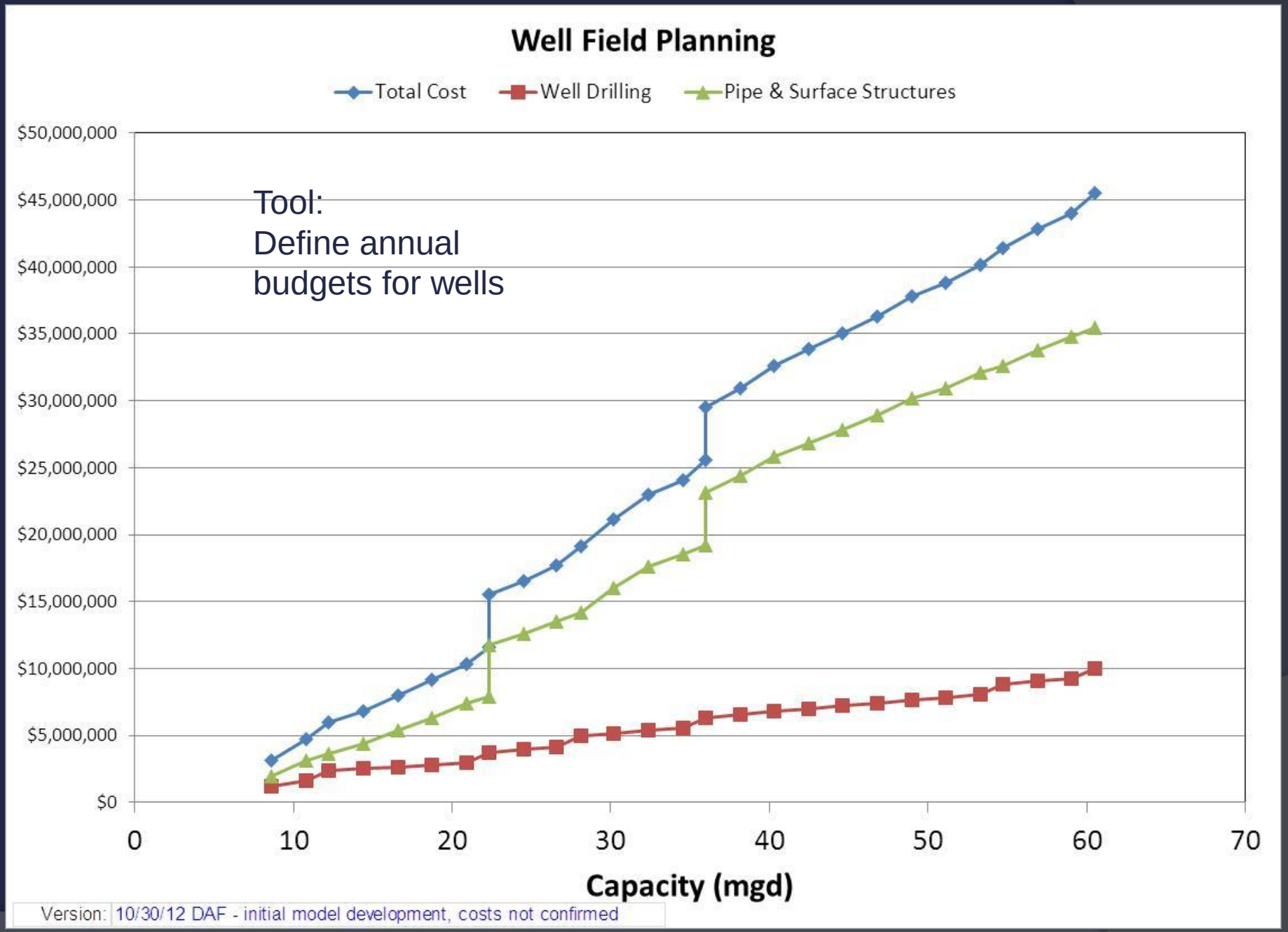
- North Minneapolis and Fridley campus
  - Most advantages
- Prairie du Chien - Jordan as primary source
  - Test the Tunnel City-Wonewoc (TC-W, formerly F-I-G)
  - Use Mount Simon-Hinckley (MSH) if TC-W limited
- Least costly system
  - Reduced pipeline costs
  - Minimal treatment costs (No known contamination)
- Cost: around $46 million
  - Work should be done over several years

Flexible path forward

- Carry alternatives 5-7 to next steps
- Define annual budgets for wells

- More detailed investigations
- Refine alternatives as data is available

- Adjust strategy as each well capacity is known


Well Field Planning
Total Cost
Well Drilling
Pipe & Surface Structures
$50,000,000
$45,000,000
$40,000,000
$35,000,000
$30,000,000
$25,000,000
$20,000,000
$15,000,000
$10,000,000
$5,000,000
$0
0
10
20
30
40
50
60
70
Capacity (mgd)
Tool:
Define annual
budgets for wells
Version: 10/30/12 DAF - initial model development, costs not confirmed